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A New Genus and Two New Species of Unusual Dromiid Crabs (Brachyura: Dromiidae) from Northern Australia

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ABSTRACT. A new genus, *Desmodromia* n.gen., and two new species of dromiid crabs are described from northern Australia. In *Desmodromia* the rostrum is tridentate, the anterolateral teeth are well developed, the last two pairs of legs have no opposing propodal spines, and the dactyli on these limbs are rotated. The new genus is similar to *Epipedodromia* Andre, 1932 and *Homalodromia* Miers, 1884, but may differ from them in using bivalve shells for camouflage instead of sponges. *Desmodromia* shares some pereopod characters with the shell-carrying genus *Hypoconcha* Guerin-Meneville, 1854, but these characters probably evolved independently.

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McLay (1998) recently described a new genus and species of the Dromiidae from the Timor Sea, northern Australia. *Alainodromia timorensis* McLay, 1998 was described from collections made almost one hundred years ago by the Royal Navy but which laid unrecognised in the collections of the British Museum. Here I describe two new species, belonging to another new genus, collected from the same general area during the 1930's but until now overlooked amongst the extensive collections of the Australian Museum, Sydney. The existence of this new material was alluded to by McLay (1993: 225).

This paper is the first of a series of papers on the dromiid crabs of Australia. The generic revision of the family by McLay (1993) changed many of the names of the Australian fauna and created several new genera for species already known. Besides *Desmodromia* n.gen., the list of Australian genera includes *Dromidiopsis* Borradaile, 1900, *Lauridromia* McLay, 1993, *Dromia* Weber, 1795, *Haledromia* McLay, 1993, *Fultodromia* McLay, 1993, *Paradromia* Balss, 1921, *Petalomera* Stimpson, 1858, *Stimdromia* McLay, 1993, *Conchoecetes* Stimpson, 1858, *Austrodromidia* McLay, 1993, *Cryptodromiopsis* Borradaile, 1903, *Cryptodromia* Stimpson, 1858, *Epigodromia* McLay, 1993, *Epipedodromia* Andre, 1932 and *Alainodromia* McLay, 1998.

Measurements given are carapace width × carapace length (CW×CL) in millimetres, and indicate the maximum dimensions.

Dromiidae De Haan, 1833

Desmodromia n.gen.

Diagnosis. Carapace about as wide as long or slightly wider than long, subpentagonal, surface flattened or slightly convex, smooth or finely granulated. Rostrum tridentate, supraorbital margin and anterolateral teeth flattened and eave-like. Chelipeds about same size as first pair of walking legs and without epipod. Chelipeds and legs armed with long thin crest-like ridges. Female sternal sutures end apart between bases of first walking legs. Last two pairs of legs reduced, no propodal spines opposing dactyli. All abdominal segments freely movable. Uropods well developed, visible externally and used in abdominal locking mechanism.

Type species. *Desmodromia griffini* n.sp. by present designation.

Etymology. The generic name *Desmodromia* is a combination of Desmond, the first name of Des Griffin, and the generic name *Dromia*. The new generic name recognises the contribution of Des to the study of Australian brachyurans, in particular his work on the Majidae and Dromiidae.

Discussion. The discovery of *Desmodromia* n.gen. adds another genus to a group of similar dromiid genera which includes *Homalodromia* Miers, 1884, and *Epipedodromia* Andre, 1932. Prior to 1932, *E. thomsoni* Fulton & Grant, 1902 was known as *Platydromia thomsoni* Fulton & Grant, 1902. Apart from *Homalodromia*, which is widely distributed in the Indo-Pacific, both the other genera are endemic to Australian waters. *Homalodromia coppingeri* Miers, 1884 is known from New Caledonia but has not yet been reported from Australia (see McLay, 1993). *Homalodromia* and *Epipedodromia* are monotypic.

The characters shared by *Epipedodromia, Homalodromia* and *Desmodromia* are: no epipod on the cheliped, small size, carapace largely smooth, chelipeds small, about same size as first walking legs, last two pairs of legs reduced, last pair subdorsal. Differences between the three genera are summarised in Table 1. The most important differences between them are: the rostrum is tridentate in *Desmodromia* (bidentate in the other two), the anterolateral teeth are well developed in *Desmodromia* (absent or very small in the other two), the last two pairs of legs lack opposing propodal spines, the dactyli are rotated in *Desmodromia* (present and normal in the other two), and *Epipedodromia* lacks uropods (present in the other two and used in the abdominal locking mechanism).

Table 1. Comparison of *Epipedodromia* Andre, 1932, *Homalodromia* Miers, 1884, and *Desmodromia* n.gen.

	Epipedodromia	*Homalodromia*	*Desmodromia*
ratio CW/CL	as wide as long	width less than length	as wide or slightly wider than long
carapace surface	minutely granulate	smooth	smooth or finely granulated
rostrum	bidentate, eave-like	bidentate, teeth subacute, on prominent broad eaves	tridentate, eave-like
anterolateral margin	teeth absent	teeth very small	teeth well developed, eave-like
last two pairs of legs	third leg shortest, dactyl opposed by one propodal spine; fourth leg shorter than first leg, dactyl opposed by one propodal spine	third leg shortest, dactyl opposed by one propodal spine; fourth leg about as long as first leg, dactyl opposed by one propodal spine	both legs shorter than first leg, third shortest; no opposing propodal spines; dactyli rotated at right angle to limb axis
sternal sutures	end apart between chelipeds on raised ridge	end apart on tube-like structures behind chelipeds	end apart between bases of first walking legs
uropods	absent	small, visible externally, used in abdominal locking mechanism	small, visible externally, used in abdominal locking mechanism
depth	shallow waters to 60 m	24–50 m	shallow waters to 15 m
maximum CW	11–12 mm	11–12 mm	around 10 mm
camouflage	unknown, but probably sponge	sponge	?bivalve shells
distribution	southern Australia	Indo-West Pacific, but not known from Australia	northern Australia

Desmodromia griffini n.sp.

Figs. 1a–d, 3a

Material examined. HOLOTYPE Darwin Harbour (*sic* Port Darwin), Australia, dredged, 9.2 m, no date, 1♀, 9.5×9.1 mm (AM registration number: P10443) (coll. F. Reynolds Morris).

Description. Carapace wider than long, only slightly convex, almost flat, surface minutely granulate. Branchial and cardiac grooves only faintly evident. Frontal groove not evident but two low swellings present behind frontal area. Rostrum tridentate, median tooth, blunt, strongly deflexed, longer than lateral teeth but not visible dorsally. Lateral teeth rounded, directed anteriorly, continuing posteriorly as a slightly concave supraorbital shelf above eyes, ending at postorbital corner as a rounded lobe. Beneath this lobe there is a steeply descending concave margin to orbital fissure. Suborbital margin truncate. Anterolateral carapace margin begins at level of postorbital corner, armed with two teeth. First tooth broad, flattened, eave-like, anterior corner separated from postorbital corner by small gap. Second tooth blunt and set at higher level, follows closely behind first, its posterior margin continued without interruption to small blunt posterolateral tooth behind branchial groove. Posterolateral margins subparallel, bearing several small tubercles.

First article of antenna much wider than long, beaked medially, not gaping, upper lobe strongly down-curved. Second article longer than wide, surface convex, lateral margin near base bluntly produced, distomedial corner produced as blunt spine on which third article is inserted at an angle. Tip of exopod bilobed, reaching joint between third and fourth articles, inner lobe curving over base of eyestalk. Epistome smooth, concave.

Subhepatic area slightly convex, surface minutely granulate, beneath suborbital margin is small blunt tubercle, and raised area adorned by prominent crescent shaped ridge, with larger granules, enclosing several tubercles. Crista dentata has seven or eight blunt spines. Sternal sutures 7/8 terminate apart between bases of first walking legs on prominent circular tubercles.

Chelipeds lightly built, not much longer than first pair of walking legs, surface minutely granulated. Merus trigonal, surface smooth, corners produced and crest-like. Margins of carpus also crest-like, outer face carries two semi-continuous central ridges, and distal border is produced as two lobes. Outer face of propodus has central longitudinal crest, interrupted to produce small flanges; edges of upper propodal surface produced, making surface concave, left propodus carries longitudinal ridge and small proximal tubercle, while right propodus has ridge interrupted, forming two small swellings. Fingers almost straight, gaping, upper surface of dactyl bears longitudinal ridge, both fingers hollowed out internally and armed with 8–9 well-developed teeth.

Surfaces of first two pairs of walking legs minutely granulated, borders of all articles except dactyli produced, crest-like, inner margins of dactyli armed with five small spines increasing in size distally.

Last two pairs of legs reduced, last pair subdorsal, dactyli short, curved and without any opposing propodal spines.

All segments of female abdomen freely movable, surface smooth, borders produced, especially at posterolateral corners, uropods well developed and visible externally. Telson wider than long with convex posterior margin. Abdominal locking mechanism not functional (tubercles absent on coxae of first walking legs) because specimen is a mature female.

Etymology. The specific name uses the surname of Des Griffin.

Camouflage. Although the type specimen was not accompanied by a piece of camouflage, *D. griffini* may carry a bivalve shell for camouflage (see Discussion below).

Depth. The female was dredged from shallow water around 10 m.

Distribution. Known only from the type locality, Darwin Harbour, Australia.

Desmodromia tranterae n.sp.

Figs. 2a–d, 3b

Material examined. HOLOTYPE Ninety Mile Beach, between Broome and Wallal, Australia, dredged, 14.7 m, 1930: 1♀, 7.2×7.0 mm (AM registration number: P9910) (coll. Captain R. Bourne).

Description. Carapace about as wide as long, surface slightly convex, regions not defined, branchial groove not evident. Rostrum tridentate, median tooth well developed, strongly deflexed but visible dorsally. Lateral teeth combined with supraorbital margin that is greatly expanded over eyes. Margin of left supraorbital eave interrupted by two small notches, but on right hand side only single notch present. Posterior margin of supraorbital eave produced, almost meeting anterolateral tooth. Orbital fissure deep, suborbital margin unarmed, truncate. Anterolateral carapace margin begins at level of postorbital corner, armed with single, broad eave-like tooth whose exact shape differs on each side. Anterolateral tooth continued posteriorly and expands to form widest point of carapace. No posterolateral tooth, posterolateral margins convergent.

First article of antenna much wider than long, beaked medially, gape narrow, upper beak strongly down-curved. Second article much longer than wide, narrowing mid-way, surface convex, lateral margin near base bluntly produced, distomedial corner produced as blunt spine on which third article is inserted at an angle. Tip of exopod bilobed, reaching joint between third and fourth articles, inner lobe curving over base of eyestalk. Epistome smooth, concave.

Subhepatic area convex, surface minutely granulated, shaped to closely accommodate cheliped, small tubercle near suborbital margin and another near corner of third maxilliped. Crista dentata bearing six or seven small sharp spines. Female sternal sutures 7/8 end apart without

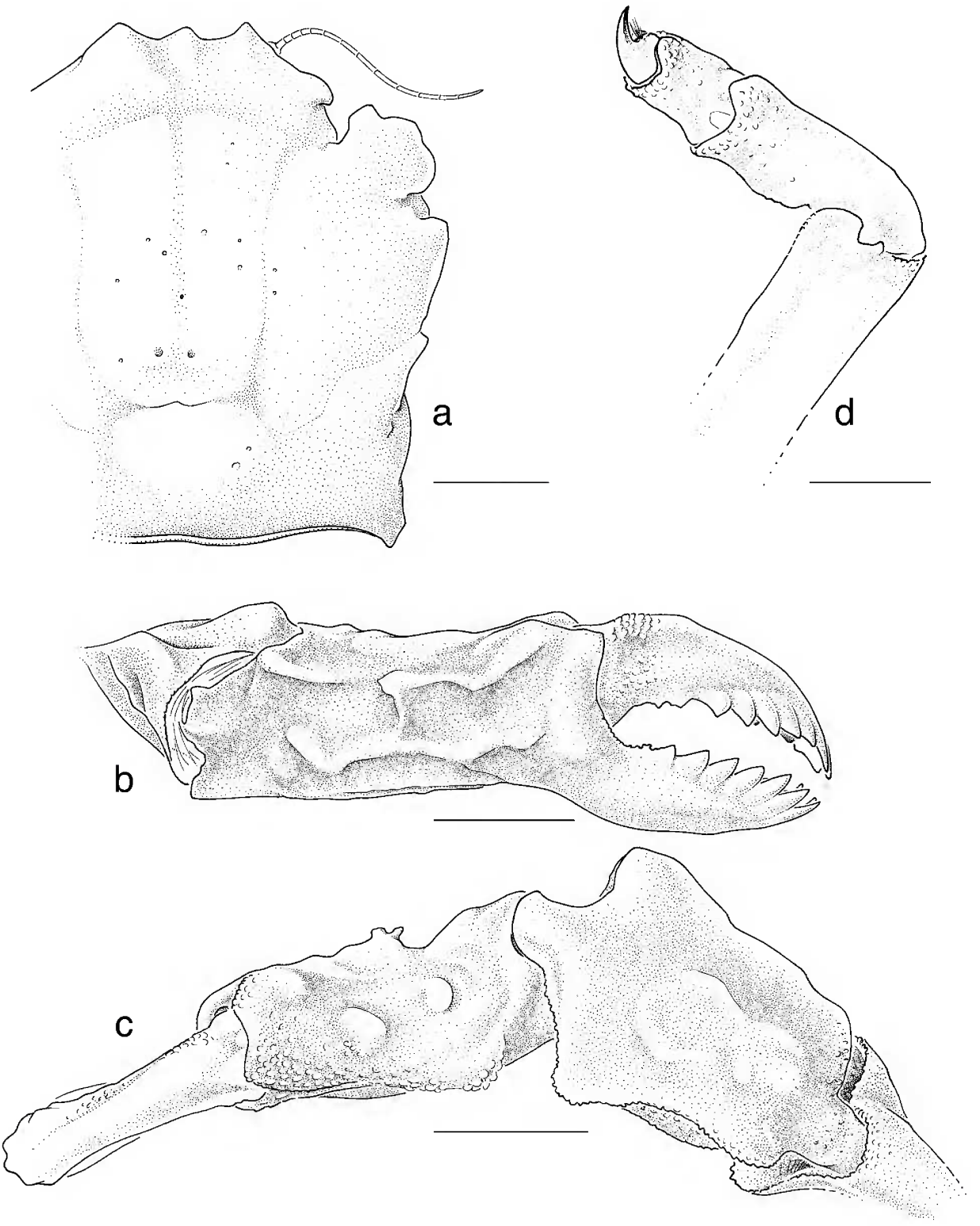

Figure 1. *Desmodromia griffini* n.sp., ♀, 9.2×9.1 mm, holotype, Port Darwin, Australia, 9.2 m: a, dorsal view of right half of carapace; b, outer face of right cheliped; c, dorsal view of right cheliped; d, dorsal view of left fourth leg (AM P10443). Scale bars represent 2 mm for a–c and 1 mm for d.

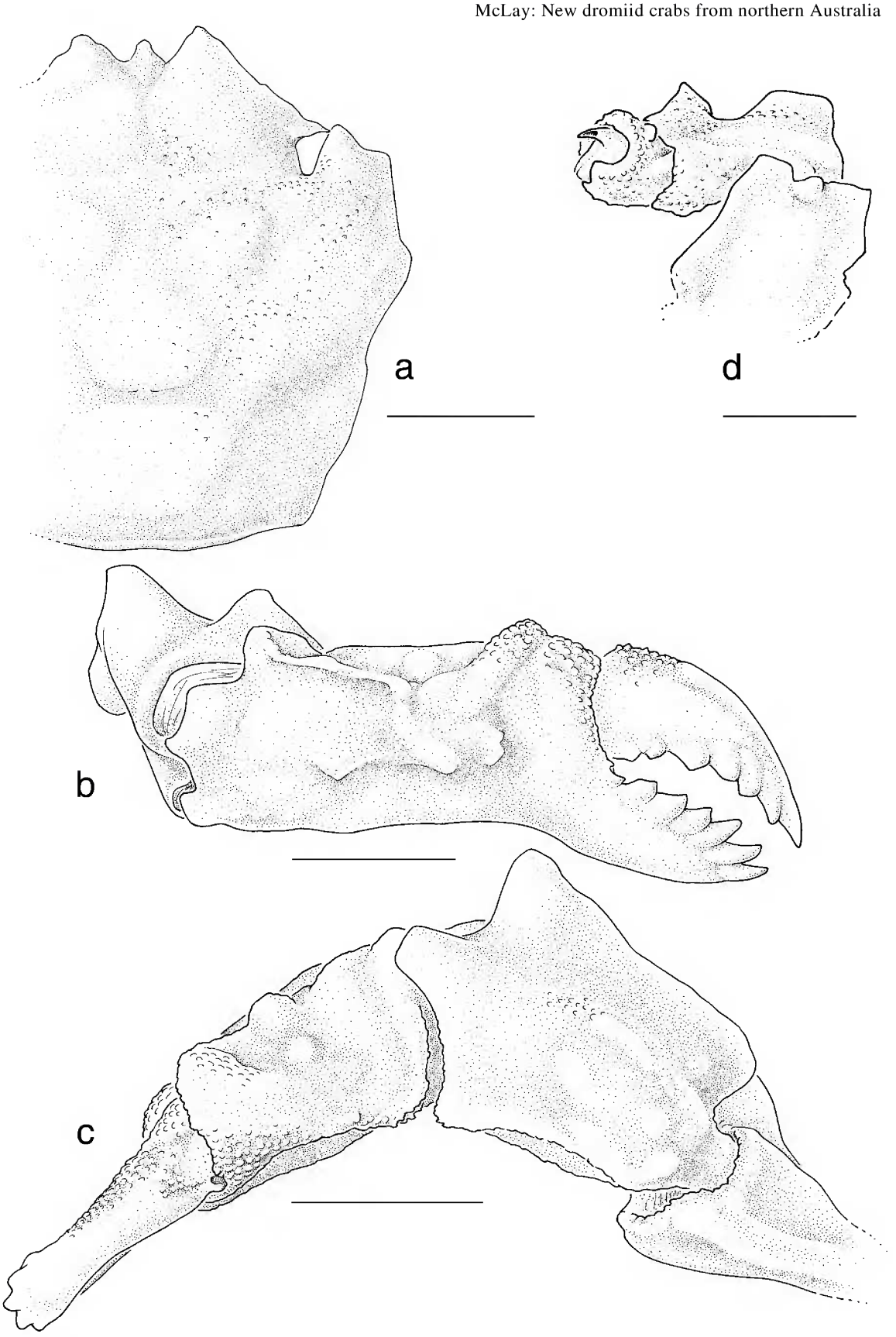

Figure 2. *Desmodromia tranterae* n.sp., ♀, 7.2×7.0 mm, holotype, Ninety Mile Beach, between Broome and Wallal, Australia, 14.7 m: a, dorsal view of right half of carapace; b, outer face of right cheliped; c, dorsal view of right cheliped; d, anterior view of left third leg (AM P9910). Scale bars represent 2 mm for a–c and 1 mm for d.

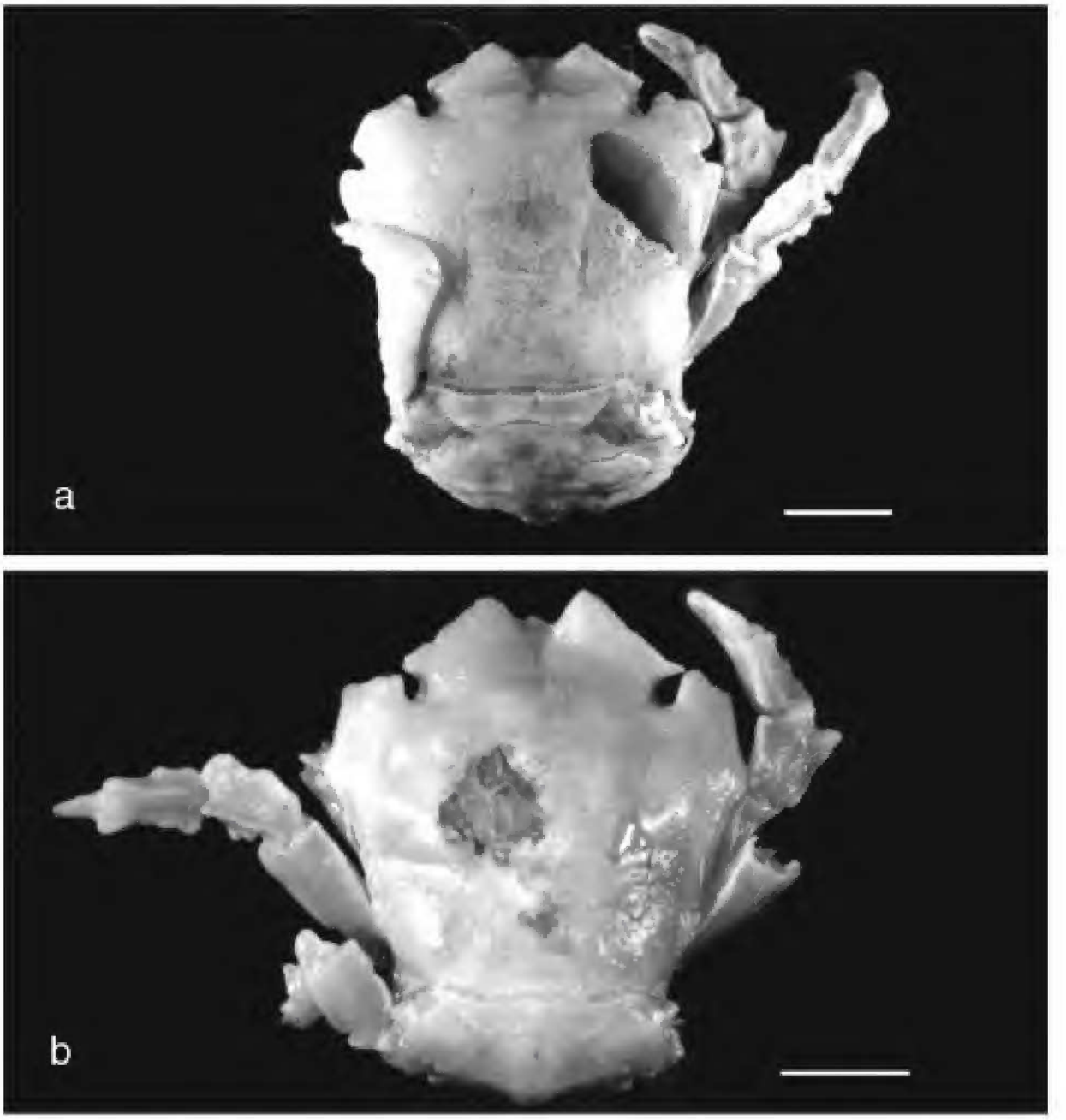

Figure 3. a, *Desmodromia griffini* n.sp., ♀ 9.2×9.1 mm, holotype, Darwin Harbour, Australia, 9.2 m (AM P10443): dorsal view of whole crab, left cheliped and first three legs, and the last three right legs not shown. Scale bar represents 3 mm. b, *Desmodromia tranterae* n.sp., ♀ 7.2×7.0 mm, holotype, Ninety Mile Beach, between Broome and Wallal, Australia, 14.7 m (AM P9910): dorsal view of whole crab, left second and fourth legs, and part of the first, and last three right legs not shown. Scale bar represents 2 mm. In both photos the darker area on each carapace indicates accidental damage incurred after the drawings were made.

tubercles between bases of second walking legs. The type specimen is an immature female, so the sternal sutures may have not reached their full length, as found in *D. griffini* (see above).

Chelipeds small, margins of articles produced and crest-like. Upper surface of carpus concave, distal margin produced as two lobes. Outer face of propodus with longitudinal ridge bearing two flanges and joined to margin above it; upper surface concave with two small rounded tubercles on right propodus, but these are absent on left hand side. Fingers straight, upper margin of dactylus crest-like, margins armed with six or seven well-developed teeth.

Articles of first two pairs of walking legs have crest-like

margins, inner margins of dactyli armed with five or six small spines.

Last two pairs of legs reduced, last pair subdorsal, dactyli short, curved and without any opposing propodal spines.

Abdominal segments freely movable, surface smooth, borders produced, especially at posterolateral corners, segments five and six have pair of blunt medial tubercles on raised ridge, separated from lateral margins by deep channels that continue on to telson. Uropods well developed and visible externally, fitting in front of small tubercles on coxae of first walking legs. The type is an immature female so abdominal locking mechanism still functions. Telson wider than long, posterior margin truncate.

Etymology. The specific name for this new species acknowledges the contribution of Mrs Helen Tranter, the long-serving research assistant of Des Griffin, to the study of Australian decapods.

Camouflage. No camouflage material was included with the *D. tranterae* specimen. This species may carry bivalve shells for camouflage (see Discussion below).

Depth. Only known from shallow water of around 15 m.

Distribution. *Desmodromia tranterae* is only known from North Western Australia.

Key

The following key may be used to separate the species of *Epipedodromia, Homalodromia* and *Desmodromia* discussed in this paper.

1 rostrum tridentate, anterolateral teeth well developed, eave-like 2

—— rostrum bidentate, anterolateral teeth absent or very small and concealed beneath margin 3

2 two notches in anterolateral margin, clearly defining two eave-like teeth ..... *Desmodromia griffini* n.sp.

—— only a single notch in anterolateral margin defining one broad eave-like tooth ..... *Desmodromia tranterae* n.sp.

3 behind frontal carapace margin is a prominent arcuate ridge divided into four equal parts by deep grooves, uropods absent ..... *Epipedodromia thomsoni* (Fulton & Grant, 1902)

—— arcuate ridge on carapace absent, uropods present ..... *Homalodromia coppingeri* Miers, 1884

Discussion

The structure of the last two pairs of legs of both the new species suggests that they may use a different kind of camouflage material from most other dromiids. The dactyli on both limbs are small, stout, and curved and not opposed by propodal spines. In most dromiids, these propodal spines form a subchelate mechanism used for grasping pieces of soft camouflage material like sponges or ascidians. The third pair of legs hold the posterior margin while the longer fourth pair hold the anterior margin of the camouflage cap. While the relative size of the two limbs is similar to other dromiids, *D. griffini* and *D. tranterae* lack a subchelate mechanism.

In sponge-carrying crabs (e.g., species of *Dromidiopsis* and *Cryptodromia*), the dactyli are long and thorn-like, opposed by one or more propodal spines, and their axis is the same as that of the preceding articles. In both of the new species, however, the dactyli of the last two pairs of legs are rotated through 90° and are therefore directed at right angles to the axis of the rest of the limb. These species may not carry soft camouflage material, but instead use something hard like bivalve shells.

The structure and orientation of the dactyli of the last two pairs of legs is similar to that found in the genus *Hypoconcha* Guerin-Meneville, 1854 whose species are known to carry bivalve shells. The third pair of legs fit into the bivalve hinge line, while the fourth pair grasp the edges of the shell. Besides the structure of the last two pairs of legs, the species of *Desmodromia* also share other similarities with *Hypoconcha*: presence of strong eaves overhanging and protecting the eyes and a flattened carapace surface that would allow the crab to fit closely under the shell. Also the carapace is poorly calcified, although not membranous as is found on the posterior half of the carapace in *Hypoconcha*. All of these shared characters point to *Desmodromia* being another shell-carrying dromiid genus.

Besides *Hypoconcha*, which is found around tropical American coasts, the only other shell-carrying genus is *Conchoecetes* Stimpson, 1858, which has a wide distribution in the Indo-West Pacific, including Australia. However, the method of grasping the shell is different in *Conchoecetes*. Members of this genus use large talon-like dactyli on the third legs to grasp the hinge line of its bivalve shell while the fourth legs are reduced and not so important for shell carrying. Also *Conchoecetes* has an epipod on the cheliped whereas *Hypoconcha* does not. For these reasons, *Desmodromia* is more like *Hypoconcha* than *Conchoecetes*.

However, the similarity of *Desmodromia* to *Hypoconcha* only relates to the structure of the last two pairs of legs and I think that it represents a case of parallel evolution. *Hypoconcha* has several characters (e.g., the absence of a rostrum, the peculiar lunate coxae of the pereopods) not necessarily related to camouflage, which make them a separate group. McLay (1993) indicated that the species of *Hypoconcha* should be placed in a separate family. Recently, McLay *et al.* (in press) compared the larval characters of *Hypoconcha* and *Conchoecetes* with other dromiids and the new family should include both these genera. This information suggests that the two best-known shell carrying genera shared a common ancestor. Meanwhile *Desmodromia* has many dromiid characters that suggest they belong amongst the Dromiidae. Thus, I propose that shell carrying evolved twice, once in the ancestor of *Hypoconcha* and *Conchoecetes*, and once in the group to which *Desmodromia* belongs (see Table 1).

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